NOAA Teacher at Sea
Jim Jenkins
Onboard NOAA Ship MILLER FREEMAN
April 18 - 30, 2005

Day 2: April 19, 2005
Latitude: 55, 36, 50 North
Longitude: 155, 51, 00 West
Visibility: 10 Nautical Miles
Wind Direction: 164
Wind Speed: 18 Knots
Sea Wave Height: 1-2 Feet
Sea Swell Height: 2-3 Feet
Sea Water Temperature: 5 Degrees C
Sea Level Pressure: 1002.8
Cloud Cover: Cloudy


Mr. Jenkins holding a temperature sensor.

Science and Technology Log:
The better part of the morning was spent putting temperature and pressure sensors in metal cages. I will send a photo with the subject line, "Metal Cages" so that you will have a good idea of the construction of these devices. The sensors mounted in metal cages are suspended from moorings at 3 feet intervals to give scientists a good indication of the temperatures at various depths in the ocean. Data collected from similar sensors has been collected for a long time and will continue to be collected well into the future. Scientists can look at the data collected over the years to draw conclusions about the patterns noted. For example, should temperatures continue to rise over the years, scientists might look for a reason for this rise in temperature. You have heard of the idea of "Global Warming." Data collected in this project can be used to monitor the severity of this problem.

Today has been mainly a day of transit, the term used by NOAA folks to refer to travel to a work location. The down time gave me the opportunity to interview my roommate, Chris Garsha, an engineer with the Scripps Institution of Oceanography in San Diego, California. Chris and Lisa Munger, a doctoral student from the University of California at San Diego, are here to place instruments in the sea which will monitor whale calls. Chris and Lisa are great people. They provided a lot of good information which I will share with you now. Also, they volunteered to e-mail you with more information about whales when they return home to California. I gave them my card so that they would have your school address.

First, I will give you the address of a web site that both Chris and Lisa recommended:
http://cetus.ucsd.edu

The site has sounds of whales which have been recorded by the instruments that Chris and Lisa are here to deploy. I know that you will enjoy this.

Do you remember studying sound waves in class? I think that you will remember that a wavelength is measured from crest to crest, or from trough to trough. Chris and Lisa use this idea when recording sounds of whales. They measure the frequency of whale sounds in Hertz (Hz). 1 Hertz (Hz) would be 1 wavelength per second. 40 Hz would be 40 wavelengths per second. 1 Kilohertz (kHz) would be 1,000 wavelengths per second. 40 kHz would be 40,000 cycles, or wavelengths per second. I hope that I have explained this clearly, please let me know if this is not the case.

Chris and Lisa are going to put an instrument in the water which will be attached the top to a huge yellow ball which will float just beneath the surface of the sea. The bottom of their instrument will be attached to one of the railway wheels we mentioned yesterday so that it will be in the same place when they come back to pick up their instrument in 6 months.

The instrument that Chris and Lisa are going to put into the sea has three tubes. One of the tubes is for power. The power is provided by the same D cell batteries that you use in your flashlight at home. Only in this case, the power is provided by 192 batteries!!!

A second tube contains a data logger to record whale sounds and associated electronics. This tube contains sixteen 80-gigabyte discs. This represents the computing power of sixteen lap top computers.

The third tube contains a hydrophone. This is a device that initially picks up the pressure caused in the water by whale's sound. The pressure of the sound causes oil inside the hydrophone to move. This movement or pressure is picked up by electronics inside the tube and recorded.

As I noted earlier, Chris and Lisa are coming back in 6 months to pick up their instrument and analyze the sounds. Some of the sounds will be converted to spectrograms so that they can analyze the sounds visually. Loud sounds will show up on the computer screen in shades of red. Softer sounds will show in shades of blue.

Human hearing is in the 20 Hz to 20,000 Hz range. This will give meaning to some of the things I am about to tell you. For example, Baleen whales (Right Whales or Fin Whales) make lower frequency sounds in the 10 Hz to 10 kHz range. Would you be able to hear a Fin Whale making a sound at its lowest frequency? I look forward to your answer to this question.

Toothed whales (Dolphins, Porpoises, Killer Whales, Sperm Whales and Beaked Whales) make sounds at higher frequencies. This helps Chris and Lisa to tell a toothed whale from a baleen whale just by listening to their sound.

Did you know some whales make different sounds for different reasons? For example, a Killer Whale whistles at a lower frequency for social reasons of communication. Higher frequency clicks are used for echolocation, just like the Little Brown Bats which live in caves there in Virginia.

Chris and Lisa are scheduled to put their instrument into the water shortly. Please let me know if you would like an update on its deployment?

Personal Log:
Your teacher had an old man's day, retiring at noon for a two-hour nap. Some seasickness had persisted so I decided to see it I could sleep it off. Well it worked! After not eating all day, I had a delicious dinner that ended with my all time comfort food, banana cream pie. I feel great!

I must confess that a dose of Dramamine taken just after getting up may have helped the situation. You may find humor in the fact that I chose the Less Drowsy Formula because I did not want to waste time sleeping while I was here!

Question for the day:

Today's seawater temperature is 5 degrees Celsius. Can you convert this to degrees Fahrenheit?

Signing off until tomorrow,

Mr. J.